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1. My knowledge of production at the Leuna Plant in Merseburg, Thuringia, Germany (Soviet Zone) is extremely limited, because [redacted]

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department. Furthermore, the Soviets abolished the former Leuna practice of publishing production figures, and instead published only the achievement percentages of the production quotas established for the various departments in the plant. Since these assigned quotas were known to only a few of the administrative officers, the quota percentages give no indication of the actual production output. It was almost impossible to estimate the production capacity of the plant, because the plant was generally in such a state of disrepair that the actual output did not reflect its capacity. 25X1A

2. [redacted]

Enclosure (A) is a flow sheet of Leuna production processes in 1947, starting from the basic raw materials. The raw materials are air, synthesis gas, and water gas. The air is liquefied and nitrogen is distilled off, leaving liquid oxygen. Synthesis gas is obtained by gasifying brown coal in the Winkler converter, and consists mainly of carbon monoxide and nitrogen, with some hydrogen. Water gas, manufactured by reacting hot coke with steam, yields additional amounts of carbon monoxide and hydrogen. The carbon monoxide is removed from these gases by passing them through an alkaline copper solution, which absorbs the carbon monoxide. The solution is then heated to liberate the CO. The

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25X1A

hydrogen and nitrogen are used to make ammonia, and hydrogen is reacted with CO to make methyl alcohol. Hydrogen is also used for other hydrogenation reactions, such as the hydrogenation of tar oils to produce gasoline.

3. The Leuna Plant, the largest producer of oxygen in the Soviet Zone of Germany, produces about 90 tons of liquid oxygen per day from air liquefied in Linde ice machine equipment. Some of the oxygen is bottled in steel cylinders of 15 liters capacity, at a pressure of 150 atmospheres; the remainder is shipped to other plants in the Soviet Zone as liquid oxygen in special insulated tank cars of the Dewar flask type. The production of gaseous nitrogen, distilled off the liquid air, amounts to about 360 tons per day.

4. The Leuna Plant produces about 400 tons of ammonia per day, by the reaction of nitrogen and hydrogen in the Haber-Bosch process. This is sold as liquid ammonia, aqueous ammonia, and ammonium sulfate. The latter is produced by reacting carbon dioxide with ammonia and powdered calcium sulfate to give insoluble calcium carbonate and ammonium sulfate, which is recovered by evaporating the filtrate. Brown oxide of iron catalyst is used to convert CO to CO_2 in this process. During the spring and fall fertilizing seasons, I have seen two trains of about 50 open cars each, loaded with fertilizer, leave the Leuna Plant daily. I estimate the production of ammonium sulfate at about one-sixth the war production rate. (Formerly there were about 30 evaporators in an operative condition; now there are about six, and they are in poor condition because of the scarcity of lead, which is the non-corrosive metal used in these evaporators.) Ammonium nitrate and calcium nitrate are proposed new products at Leuna. Ammonia will be burned to give nitric acid, and this will be neutralized with ammonia and with lime to give the above two products. Ammonium nitrate can be used as a fertilizer or as an explosive.

5. Leuna has a special catalyst research department and is essentially the only producer of catalysts in the Soviet Zone of Germany. I estimate the Leuna production of catalysts at 20-40 tons per month, some of which are as follows:

(a) Hydrogenation catalysts:

tungsten sulfate, activated alumina, finely divided nickel, and molybdenum oxide

(b) Ammonia catalysts:

black oxide, mainly Fe_3O_4 and small amounts of other additives

(c) Catalysts for the synthesis of methyl alcohol and other higher alcohols from carbon monoxide and hydrogen:

copper, chromic oxides, zinc oxide, and small amounts of potassium oxide

(d) Catalysts for the two-stage hydrogenation of coal by the Bergius process, to produce oils:

iron sulfate mixed with the coal in the first stage; tungsten or molybdenum over which the vapors are distilled in the second stage

(e) Catalysts for making carbon dioxide from carbon monoxide in the water gas shift reaction:

brown oxide of iron

5. Leuna has a large capacity for producing methyl alcohol; about 60-80 tons of methyl alcohol are made daily. Carbon monoxide and hydrogen are reacted together at 200-300°C and 250 atmospheres pressure. Hexyl, methyl-hexyl, iso-butyl, allyl, and other higher alcohols are produced at the same time in varying amounts, depending upon the operating conditions. Some methyl alcohol is used for solvents and esters at Leuna, but most of it is distributed to other plants in the Soviet Zone. I do not know of any methyl alcohol going to the USSR. The entire ammonia production could be converted to the manufacture of methyl alcohol by lining the autoclaves with copper.

6. Two types of polyvinyl chloride are produced at Leuna; one type is partly chlorinated and the other type is completely chlorinated. These resins have certain limitations, such as deformity under heat and pressure and softening when heated in contact with water at 60°C. Polyvinyl chloride resins are used in the manufacture of pipes which carry hydrochloric and sulfuric acids. When plasticized, the resins are transparent and rubber-like and are frequently used as rubber substitutes. They are excellent for conveyor belting, shoe soles, etc. Dr. Wilhelm Falkenberg, experimenting with plasticizers for these resins, obtained a plasticizer from the first fraction resulting from the distillation of oil made by the hydrogenation of brown coal in the Bergius process; this plasticizer distilled at about 180°C. He made another plasticizer by esterifying a carbon acid of the Leuna series with a higher alcohol; this was called Mesamol. Polyvinyl chloride plasticized with these two products gave an elongation of 200% and a return of 25% at 20°C. A mixture of 45% polyvinyl chloride (Igelit), 35% Mesamol and 20% of the first fraction oil plasticizer has an elasticity 80% that of rubber and holds this elasticity up to -15°C but breaks at -20° to -24°C. The heat conductivity is 0.1 to 0.3 kilocal per hour per meter for one degree C, as compared to a conductivity of 0.3 to 0.4 in the same units for rubber. It was found to be quite satisfactory in the manufacture of automobile tubes but gives a heavy ride when used in automobile tires. Igelit plasticized with about 40% tricresyl phosphate constitutes good floor and worktable covering; if greasy foods are placed on such coverings, however, the grease will dissolve out the toxic tricresyl phosphate which renders the foods inedible.

7. There is a plan to build a urea plant at Leuna which initially will have only one small reactor about 1.5 x 2 meters, with an estimated capacity of about 10-12 tons per day. Urea is now being supplied Leuna from Piesteritz in the East Zone and Oppau in the West Zone of Germany. The process for urea production is to react carbon dioxide with ammonia under high pressure to give urea and water. This production requires special metals such as V-2-A steel, monel metal, lead and aluminum. The great scarcity of these special metals in the East Zone will probably delay the start of urea production at Leuna.

8. Leuna makes Iporka, a urea-formaldehyde resin which is very light in weight and has a low heat conductivity. Its specific gravity is about 0.35. This resin was tested about 14 years ago at Weimar (Soviet Zone) on the absorption of radio waves and supersonic waves. I do not know the length of the waves used or

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the results of these tests. However, tests conducted in 1935 showed the product to be very good in the absorption of sound waves. I do not know of the use of this product on submarines. /Aerated polyvinyl chloride (cellular Igelit) with a density of 0.35, was used by the Germans in the Jaumann-Absorber to protect submarines from radar detection./

9. Kaurit resin is another urea-formaldehyde resin made at Leuna. The USSR promotes Kaurit resin production, which I estimate to be 5-40 tons per month, and ships most of it to the USSR. It is a substitute for animal glue, which is very scarce in the USSR. It is mainly used in making ply-wood.

10. Phenol-formaldehyde resins are produced at Leuna at the rate of several hundred kilograms per day. One of these resins called Nerosit is pigmented with iron oxide and used as a substitute for brass pipe. This resin has to be plasticized, but Nesrasit, a similar resin made at Leuna, has the plasticizer chemically combined with the resin. A-W-2 is another formaldehyde resin produced at Leuna, at the rate of several hundred kilograms per month. It is used to give adhesion and hardness to nitrocellulose lacquers.

11. Alkydal intermediates are made in the Organic Department at Leuna and shipped in liquid form to the Lukolux plants (lacquer factories) in the Soviet Zone of Germany. Although the demand is great, Leuna supplies only about 30 tons per month, as Dr (fnu) Bemmann of the Organic Department does not wish the Soviets to make use of the research and production of his department. (This is a general policy of the Organic Department.) Mr (fnu) Bankowski of the department follows this policy by claiming that the production is too expensive for profit.

12. Perlon production at Leuna is estimated at 10-40 tons per month, as there are only one or two small reactors in a small room. Phenol is reduced to cyclohexanol which is then oxidized to cyclohexanone. The oxime is then formed and this is rearranged to produce caprolactam by treatment with sulfuric acid. The caprolactam is then polmyermized to give perlon. Perlon is very similar to nylon and has a chain structure of $-(CH_2)_5CONH(CH_2)_5CONH-$ as compared to $-(CH_2)_6NHCO(CH_2)_4CONH-$ for nylon which is made by the condensation of hexamethylene diamine with adipic acid. Caprolactam is made in the Organic Section of Leuna under Director Dieters. The perlon fibers are tested at Leuna and then sent to Schwarzheide near Rudolstadt in Thuringia where they are woven in fabric which is then transported to the USSR. Perlon is used for making parachutes and glider towropes as well as for normal textile production.

13. The estimated capacity of synthetic benzine (gasoline) at Leuna is 300 thousand tons per year. I estimate the current annual production to be 200 thousand tons. The synthetic benzine has an octane rating of 60 to 70, and contains only a small amount of aromatic hydrocarbons. The diesel oil capacity and production are about one sixth that of the benzine. These products are made by the hydrogenation of gas tar oil at 250 atmospheres pressure. Most of these tar oils come from the East Zone but some come from the West Zone. The equipment for hydrogenation and isomerization of oils has been dismantled at Leuna and these operations are no longer possible. /This statement apparently does not apply to the hydrogenation of gas tar oils./

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Special gasolines are produced at Boehlen, Saxony and Zeitz, Thuringia which are SAG firms. Leuna also produces about one ton per hour of butane gas as a by-product.

14. Sulfuric acid is made at Leuna for her own consumption. I saw only one container about five meters in diameter and 10 meters in height in use at the plant. Leuna formerly made sulfuric acid from calcium sulfate (gypsum), and it is assumed that this process is still used.

15. The equipment for the production of amines such as methyl amines and ethylamines has been removed to the USSR; there is no amine production at Leuna. However, it is planned that amines will again be produced at the Leuna Plant.

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Enclosure (A) Flow Sheet